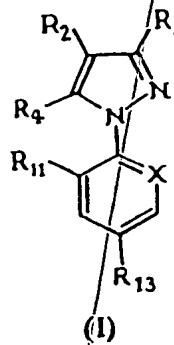


CLAIMS

1. Anti-flea and anti-tick collar or other external device for a pet, in particular a cat or dog, made of a matrix in which is incorporated from 0.1 to 40% by weight, relative to the collar, of a substance which is active against fleas and ticks, this active substance being formed of at least one compound corresponding to formula (I) below:



20 in which:

R₁ is CN or methyl or a halogen atom;

R₂ is S(O)_nR₃ or 4,5-dicyanoimidazol-2-yl or haloalkyl;

R₃ is alkyl or haloalkyl;

25 R₄ represents a hydrogen or halogen atom; or a radical NR₅R₆, S(O)_mR₇, C(O)R₇, C(O)O-R₇, alkyl, haloalkyl or OR₈ or a radical -N=C(R₉)(R₁₀);

30 R₅ and R₆ independently represent a hydrogen atom or an alkyl, haloalkyl, C(O)alkyl, alkoxy carbonyl or S(O)_rCF₃ radical; or R₅ and R₆ may together form a divalent alkylene radical which may be interrupted by one or two divalent hetero atoms, such as oxygen or sulphur;

R₁ represents an alkyl or haloalkyl radical;

5 R₈ represents an alkyl or haloalkyl radical or a hydrogen atom;

R₉ represents an alkyl radical or a hydrogen atom;

10 R₁₀ represents a phenyl or heteroaryl group optionally substituted with one or more halogen atoms or groups such as OH, -O-alkyl, -S-alkyl, cyano or alkyl;

R₁₁ and R₁₂ represent, independently of each other, a hydrogen or halogen atom, or CN or NO₂;

15 R₁₃ represents a halogen atom or a haloalkyl, haloalkoxy, S(O)_nCF₃ or SF₅ group;

m, n, q and r represent, independently of each other, an integer equal to 0, 1 or 2;

20 X represents a trivalent nitrogen atom or a radical C-R₁₂, the other three valency positions of the carbon atom forming part of the aromatic ring;

25 with the proviso that when R₁ is methyl, either R₃ is haloalkyl, R₄ is NH₂, R₁₁ is Cl, R₁₃ is CF₃ and X is N; or R₂ is 4,5-dicyanoimidazol-2-yl, R₄ is Cl, R₁₁ is Cl, R₁₃ is CF₃ and X is =C-Cl;

30 this collar or other external device being designed to ensure more than 6 months of efficacy against fleas and more than 3 months of efficacy against ticks, the efficacy preferably being maintained for several weeks even if the collar or other external device is taken off or lost or if there is a variation in the release of the compound (I) by the matrix.

(C) 2. ~~collar~~ according to claim 1, characterized in that the compound of formula (I) is such that:

30 R₁ is CN or methyl;

R₂ is S(O)_nR₃;

R₃ is alkyl or haloalkyl;

R₄ represents a hydrogen or halogen atom; or a

radical NR_5R_6 , $\text{S(O)}_m\text{R}_7$, $\text{C(O)}\text{R}_7$, alkyl, haloalkyl or OR_8 or a radical $-\text{N}=\text{C}(\text{R}_9)(\text{R}_{10})$;

R₅ and R₆ independently represent a hydrogen atom or an alkyl, haloalkyl, C(O)alkyl or S(O)₂CF₃ radical; or R₅ and R₆ may together form a divalent alkylene radical which may be interrupted by one or two divalent hetero atoms, such as oxygen or sulphur;

R₇ represents an alkyl or haloalkyl radical;

R₈ represents an alkyl or haloalkyl radical or a hydrogen atom;

R₉ represents an alkyl radical or a hydrogen atom;

R₁₀ represents a phenyl or heteroaryl group optionally substituted with one or more halogen atoms or groups such as OH, -O-alkyl, -S-alkyl, cyano or alkyl;

R₁₁ and R₁₂ represent, independently of each other, a hydrogen or halogen atom;

R₁₃ represents a halogen atom or a haloalkyl, haloalkoxy, S(O)_qCF₃ or SF₅ group;

m, n, q and r represent, independently of each other, an integer equal to 0, 1 or 2;

X represents a trivalent nitrogen atom or a radical C-R₁₂, the other three valency positions of the carbon atom forming part of the aromatic ring;

with the proviso that when R₁ is methyl, then R₃ is haloalkyl, R₄ is NH₂, R₁₁ is Cl, R₁₃ is CF₃ and X is N.

3. ~~co~~llar according to claim 2, wherein the compound of formula (I) is such that R₁ is CN.

4. ~~co~~llar according to claim 2, wherein the compound of formula (I) is such that R₁₃ is haloalkyl.

5. ~~co~~llar according to claim 4, wherein the compound of formula (I) is such that R₁₃ is CF₃.

6. ~~co~~llar according to claim 2, wherein the compound of formula (I) is such that R₂ is S(O)_nR₃.

7. Collar according to claim 6, wherein n = 1 and R₃ is chosen among the group consisting of CF₃, methyl, ethyl.

8. Collar according to claim 6, wherein n = 0 and R₃ is CF₃.

9. Collar according to claim 2, wherein the compound of formula (I) is such that X is C-R₁₂, R₁₂ being a halogen atom.

10. Collar according to claim 2, wherein the compound of formula (I) is chosen from those in which R₁ is CN, R₃ is haloalkyl, R₄ is NH₂, R₁₁ and R₁₂ are, independently of each other, a halogen atom, and/or R₁₃ is haloalkyl.

11. Collar according to claim 2, wherein the compound of formula (I) is chosen among the group consisting of compound A:

1-[(2,6-Cl₂4-CF₃phenyl)3-CN4-[SO-CF₃]5-NH₂]pyrazole
and its derivatives with n=0 and R₃ is CF₃, and n=1 and R₃ is ethyl.

12. Collar according to claim 2, wherein the collar comprises from 1 to 15% active substance.

12. Collar according to claim 2, wherein the collar comprises from 1.25 to 10% active substance.

13. Collar according to claim 2, wherein the collar comprises from 2 to 6% active substance.

14. Collar according to claim 2, wherein the collar comprises from 2.5 to 5% active substance.

15. Collar according to claim 11, wherein the collar comprises from 1.25 to 10% active substance.

16. Collar according to claim 11, wherein the collar comprises from 2 to 6% active substance.

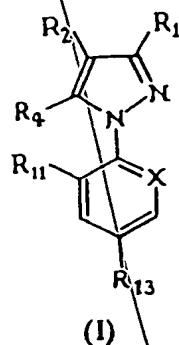
17. Collar according to claim 11, wherein the collar comprises from 2.5 to 5% active substance.

18. The collar according to claim 11, wherein the efficacy is maintained when the collar or external device is taken off or lost, over a period ranging from 2 to 3 months against fleas and from 1 to 2 months against ticks.

5 19. The collar according to claim 11, wherein it comprises a concentration of active substance which ensures effective protection against fleas for a period longer than or equal to 12 or 18 months.

10 20. The collar according to claim 11, wherein it comprises a concentration of active substance which ensures effective protection against ticks for a period longer than or equal to 12 or 15 months.

15 21. Method for eliminating fleas and ticks from pets, in particular cats and dogs, in which one attaches to the pets at least one collar or other external device which comprises a compound corresponding to formula (I) below:



in which:

R₁ is CN or methyl or a halogen atom;

R₂ is S(O)_nR₃ or 4,5-dicyanoimidazol-2-yl or haloalkyl;

R₃ is alkyl or haloalkyl;

R₄ represents a hydrogen or halogen atom; or a radical NR₅R₆, S(O)_mR₇, C(O)R₇, C(O)O-R₇, alkyl, haloalkyl or OR₈ or a radical -N=C(R₉)(R₁₀);

5 R₅ and R₆ independently represent a hydrogen atom or an alkyl, haloalkyl, C(O)alkyl, alkoxycarbonyl or S(O)_rCF₃ radical; or R₅ and R₆ may together form a divalent alkylene radical which may be interrupted by one or two divalent hetero atoms, such as oxygen or sulphur;

10 R₇ represents an alkyl or haloalkyl radical;

R₈ represents an alkyl or haloalkyl radical or a hydrogen atom;

R₉ represents an alkyl radical or a hydrogen atom;

15 R₁₀ represents a phenyl or heteroaryl group optionally substituted with one or more halogen atoms or groups such as OH, -O-alkyl, -S-alkyl, cyano or alkyl;

R₁₁ and R₁₂ represent, independently of each other, a hydrogen or halogen atom, or optionally CN or NO₂;

20 R₁₃ represents a halogen atom or a haloalkyl, haloalkoxy, S(O)_qCF₃ or SF₅ group;

m, n, q and r represent, independently of each other, an integer equal to 0, 1 or 2;

25 X represents a trivalent nitrogen atom or a radical C-R₁₂, the other three valency positions of the carbon atom forming part of the aromatic ring;

with the proviso that when R₁ is methyl, either R₃ is haloalkyl, R₄ is NH₂, R₁₁ is Cl, R₁₃ is CF₃ and X is N; or R₂ is 4,5-dicyanoimidazol-2-yl, R₄ is Cl, R₁₁ is Cl, R₁₃ is CF₃ and X is =C-Cl;

30 which method ensuring prevention and treating fleas and ticks to a high degree of efficacy and over a period exceeding 6 months against fleas and 3 months against ticks, the efficacy preferably being maintained over

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several weeks even if the collar or external device is taken off or if there is a variation in the release of the compound (I) by the collar or external device.

22. The method according to claim 21, wherein the compound of formula (I) is such that:

R₁ is CN or methyl;

R₂ is S(O)_nR₃;

R₃ is alkyl or haloalkyl;

10 R₄ represents a hydrogen or halogen atom; or a radical NR₅R₆, S(O)_mR₇, C(O)R₇, alkyl, haloalkyl or OR₈ or a radical -N=C(R₉)(R₁₀);

15 R₅ and R₆ independently represent a hydrogen atom or an alkyl, haloalkyl, C(O)alkyl or S(O)_rCF₃ radical; or R₅ and R₆ may together form a divalent alkylene radical which may be interrupted by one or two divalent hetero atoms, such as oxygen or sulphur;

R₇ represents an alkyl or haloalkyl radical;

R₈ represents an alkyl or haloalkyl radical or a hydrogen atom;

20 R₉ represents an alkyl radical or a hydrogen atom;

R₁₀ represents a phenyl or heteroaryl group optionally substituted with one or more halogen atoms or groups such as OH, -O-alkyl, -S-alkyl, cyano or alkyl;

25 R₁₁ and R₁₂ represent, independently of each other, a hydrogen or halogen atom;

R₁₃ represents a halogen atom or a haloalkyl, haloalkoxy, S(O)_qCF₃ or SF₅ group;

m, n, q and r represent, independently of each other, an integer equal to 0, 1 or 2;

30 X represents a trivalent nitrogen atom or a radical C-R₁₂, the other three valency positions of the carbon atom forming part of the aromatic ring;

with the proviso that when R₁ is methyl, then R₃ is

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cont
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haloalkyl, R₄ is NH₂, R₁₁ is Cl, R₁₃ is CF₃ and X is N.

23. ~~The method~~ according to claim 22, wherein the compound of formula (I) is such that R₁ is CN.

24. ~~The method~~ according to claim 22, wherein the compound of formula (I) is such that R₁₃ is haloalkyl.

5 25. ~~The method~~ according to claim 22, wherein the compound of formula (I) is such that R₁₃ is CF₃.

26. ~~The method~~ according to claims 22, wherein the compound of formula (I) is such that R₂ is S(O)_nR₃.

10 27. ~~The method~~ according to claim 26, wherein n = 1 and R₃ is chosen among the group consisting of CF₃, methyl, ethyl.

28. ~~The method~~ according to claim 26, wherein n = 0 and R₃ is CF₃.

15 29. ~~The method~~ according to claim 22, wherein the compound of formula (I) is such that X is C-R₁₂, R₁₂ being a halogen atom.

30. ~~The method~~ according to claim 22, wherein the compound of formula (I) is such that R₁ is CN, R₃ is haloalkyl, R₄ is NH₂, R₁₁ and R₁₂ are, independently of each other, a halogen atom and/or R₁₃ is haloalkyl.

20 31. ~~The method~~ according to claim 22, wherein the compound of formula (I) is chosen among the group consisting of compound A:

25 1-[2,6-Cl₂4-CF₃phenyl]3-CN4-[SO-CF₃]5-NH₂pyrazole
and its derivatives with n=0 and R₃ is CF₃, and n=1 and R₃ is ethyl.

30 32. ~~The method~~ according to claim 22, wherein the compound of formula (I) is present in a ^{concentration of} proportion of from 1 to 15% by weight.

33. ~~The method~~ according to claim 22, wherein the compound of formula (I) is present in a ^{concentration of} proportion of from 1.25 to 10%.

The method

34. Method according to claim 22, wherein the compound of formula (I) is present in a ~~concentration~~ proportion of from 2 to 6%.

The method

5 35. Method according to claim 22, wherein the compound of formula (I) is present in a ~~concentration~~ proportion of from 2.5 to 5% by weight.

The method

36. Method according to claim 31, wherein the compound of formula (I) is present in a ~~concentration~~ proportion of from 1.25 to 10%.

The method

10 37. Method according to claim 31, wherein the compound of formula (I) is present in a ~~concentration~~ proportion of from 2 to 6% by weight.

The method

15 38. Method according to claim 31, wherein the compound of formula (I) is present in a ~~concentration~~ proportion of from 2.5 to 5% by weight.

39. Method according to claim 31, wherein the efficacy is greater than 95% against fleas.

The method

40. Method according to claim 31, wherein the efficacy is greater than 98% or 99% against fleas.

20 41. Method according to claim 31, wherein the efficacy is greater than 80% against ticks.

The method

42. Method according to claim 31, wherein the efficacy is greater than 90% against ticks.

The method

25 43. Method according to claim 31, wherein the ~~long-~~ lasting efficacy is longer than or equal to 12 months against fleas.

The method

44. Method according to claim 31, wherein the long-lasting efficacy is longer than or equal to 18 months against fleas.

The method

30 45. Method according to claim 31, wherein the long-lasting efficacy is longer than or equal to 12 months against ticks.

The method

46. Method according to claim 31, wherein the long-

lasting efficacy is longer than or equal to 15 months against ticks.

47. ~~The method~~ Method according to claim 31, wherein the efficacy is maintained when the ~~collar~~ or external device is taken off or lost, over a period ranging from 2 to 3 months against fleas and from 1 to 2 months against ticks.

